

POKROVSKIY, G. A.

POKROVSKIY, G. A.: "An experiment in analyzing the scientific activity of the Hospital Surgical Clinic, First Moscow Order of Lenin Medical Inst." First Moscow Order of Lenin Medical Inst imeni I. M. Sechenov. Moscow, 1956  
(Dissertation for the Degree of Candidate in Medical Sciences)

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POKROVSKIY, G. I., kand. tekhn. nauk, dotsent

Improving the signalization systems in mine shafts. Ugol' 37  
no.10:33-37 0 '62. (MIRA 15:10)

1. Leningradskiy gornyy institut.

(Mine communications) (Shaft sinking)

YANI, A.E. [Jani, A.] (g.Mustvee, Estonskaya SSR); POKROVSKIY, G.I., prof.  
(Moskva)

Visible sound. Priroda 54 no.10:65-66 '65. .

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AUTHOR: Pokrovskiy, Georgiy Iosifovich (Major general of engineering technical service; Professor; Doctor of technical sciences)

ORG: Military Aviation Engineering Academy im. N. Ye. Zhukovskiy (Voyenno-vozdushnaya inzhenernaya akademiya)

TITLE: Problems of maneuvering spacecraft in near-earth orbit ✓ 82  
9 B

SOURCE: Krasnaya zvezda, 12 Feb 66, p. 6, col. 1-6

ABSTRACT: Describing the maneuvering of orbiting spacecraft as a pressing problem, Professor G. Pokrovskiy discusses some of the difficulties thus encountered. Calculations have shown, he states, that an orbital turn of 60° requires as much energy per unit of the spacecraft's mass as is required to impart the present velocity to it. When changing direction by relatively small angles, energy approximately proportional to the square of the turn angle is required. Stressing the difficulty of several spacecraft maintaining a certain formation, he states that if the spacecraft are not to expend energy they must move in a tandem formation. In a circular orbit the spacecraft would maintain constant distances and velocities; in an elliptical orbit, however, their inter-

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vals would change spontaneously. Going from apogee to perigee the formation would become elongated, with the greatest separation being attained when they reached perigee; conversely, their closest approach to each other would be at the moment they passed through the apogee of the orbit. Since the closer the spacecraft come to apogee the lower their approach velocity [to each other], the possibility of a dangerous collision is precluded.

In the case of a flight by spacecraft moving on parallel courses in a horizontal formation, Pokrovskiy continues, their approach velocity would grow with a decrease in the distance between them. After a quarter of an orbit the spacecraft would be clustered together; this would occur no matter how scattered the formation or how far apart the spacecraft are. Controllable maneuvering engines help to avoid such situations; for a 7-ton spacecraft at an altitude of 500 km, they would require a thrust of only about 1 kg.

Having emphasized that any movement in orbit may have completely unexpected results (see Extravehicular Activity in Near-Earth Orbit. Foreign Science Bulletin, v. 1, no. 8, 1965, 39-41), Pokrovskiy gives as an example a case where two spacecraft are flying parallel courses and

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directing fire at each other; all shells not striking their target would return, he states, and it is possible that they would destroy the space-craft from which they had been fired. / Orig. art. has: 2 figures.

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POKROVSKIY, C. I.

Georgiy Iosifovich

"Theory of Diffuse Reflection," Zeitschrift fur Physik, 1924, Vol.  
30, No. 1, pp 66-72.

POKROVSKIY, G. I. and VORONOV, G. P.

"On the Polarization of Light by Reflection at Diffuse Reflecting Bodies, Zeitschrift fur Physik, 1924, Vol. 30, No. 2, pp 139-150.



POLOVINSKIY, G. I. and VORONOV, G. I.

"On the Selective Reflection of Light at Diffuse Reflecting Bodies,"  
Zeitschrift fur Physik, 1924, Vol. 30, No. 6, pp358-370.

PONROVSKIY, G. I.

"On the Adsorption of Light in Optically Inhomogeneous Media,"  
Zeitschrift fur Physik, 1925, Vol. 31, No 1-4, pp 14-23.

"For direct illumination Beer's law holds only down to a limiting thickness of optically inhomogeneous mediums (Carrara glass, rust, dyed wool and cathode films). The failure of the law is due to holes, i. e., to the increased probability in thin layers that some of the light will pass through the mediums without scattering. Equations are tested on milk, white of egg, and India ink suspensions."

POKROVSKIY, G.I.

"The Depolarization of Light by Optically Inhomogeneous Media,"  
Zeitschrift fur Physik, 1925, Vol. 32, No 7-8, pp 713-720.

"Depolarization of linearly polarized light by an optically inhomogeneous system occurs in such a way that only the light hitting upon the scattering substance suffers depolarization, while the light waves passing through the voids between the suspended matter remain polarized. The relation between the relative quantity of polarized light in the outgoing rays, the thickness of the medium, the concn. of the suspensoid and the size of the suspended particles can be derived mathematically and verified by expts. Based upon these calcns. an empirical formula is deduced for the changes with time in the depolarizing properties of a  $V_2O_5$  suspension."

POKHODNIIK, G. I., and VORONKOV, G. I.

"The Depolarization of Light in Diffuse Reflection," Zeitschrift für Physik, 1925, Vol. 33, pp 860-869.

POIROVSKIY, G. I.

"Brightness of a luminous Layer," Zeitschrift fur Physik, 1925,  
Vol. 34, No 5-7, pp 496-498.

POKROVSKIY, G. I.

"The Scattering of Light in the Atmosphere," Zeitschrift fur Physik, 1925, Vol. 34, No. 1, pp 49-52.

"It is concluded that the scattering is due largely to small particles of dust."

POMEROVSKIY, G. I.

"Diffuse Reflection of Light," Zeitschrift fur Physik, 1926, Vol. 35,  
No. 1, pp 34-37.

POKROVSKIY, G.I.

"Diffuse Reflection," Zeitschrift fur Physik, 1926, Vol 35, No. 5,  
pp 390-393.



POIHOVSKIY, G. I.

"Scattering of Light in the Air," Zeitschrift fur Physik, 1926,  
Vol. 35, No. 6, pp 464-472.

POINROVSKY, G.I., and VORONKOV, G. P.

"The Light Scattering in Coarsely Dispersed Media of Higher Concentration,"  
Zeitschrift fur Physik, 1926, Vol. 35, No. 8-9, pp 633-641.

POKROVSKIY, G. I.

"Scattering of Light in the Eye," Zeitschrift fur Physik, 1926,  
Vol. 35, No. 10, pp 776-782.

POITROVSKIY, G. I.

"Diffuse Light Reflection," Zeitschrift fur Physik, 1926, Vol. 36,  
No. 6, pp 472-476.

"Goes on to consider the case where the reflection may be at any  
angle to the normal and to the direction of incidence."

POKROVSKIY, G. I.

"Polarization of Light in Turbid Media," Zeitschrift fur Physik, 1926,  
Vol. 36, No. 7, pp 548-556. (Part I)

POKROVSKIY, G.I.

"Polarization of Light in Sulfur Suspensions," Zeitschrift fur Physik, 1926, Vol. 37, No. 3, pp 172-178.

"The polarization produced by the scattering of light in a turbid medium is defined as positive when the greater component vibrates normal to the plane contg. the incident and scattered radiation, negative when the component in the plane is the greater. S. was pptd. by addn. of very small quantities of  $H_2SO_4$  to  $Na_2S_2O_3$ , and the change in polarization with increase in size<sup>2</sup> of the particles was examd. As the size increased, and inversion of the polarization took place, in the accordance with Rayleigh's theory of electromagnetic scattering. The variation of polarization with angle of scattering showed large deviations from the calcd. values, but this is attributable to the irregularity in size which the particles assume after the lapse of considerable time."

POLOVSKIY, G. I.

"Polarization of Light in Turbid Media," Zeitschrift fur Physik, 1926, Vol. 37, No 10-11, pp 722-727. (Part II)

"The classical theories of Rayleigh and Mie for the scattering of light were developed for particles of dimensions considerably less than the wave length of scattered light. In the present study, the scattering elements (milk, cinnabar, chrome yellow, ocher yellow, arsen green) are of microscopic dimensions. Curves are given for the dependence of relative polarization of the angular deflection of the entering beam. The greatest part of scattered light is apparent through reflection and refraction."

POKROVSKIY, G. I.

"Absorption of Light in Optically Inhomogeneous Media," Zeitschrift fur Physik, 1926, Vol. 38, No. 11-12, pp 648-652.

"This paper is supplementary to earlier papers. The relationship between the various constants of the formulae is developed and a value for the dimensions of the light scattering and absorbing particles is obtained."



POKROVSKIY, G. I.

"The Dispersion and Polarization of light by Dispersed Carbon,"  
Zeitschrift fur Physik, 1926, Vol. 40, No. 4, pp 278-282.

"P. detd. dispersion and polarization of light by C in the flame  
in water suspension, and by diffused reflection of C films. The  
relationship between the calcd. values of the relative polarization  
of the dispersed light and the angle of diffraction is in fair agree-  
ment with the observed values."

POITROVSKIY, G. I.,

"The Dispersion of Light in Sulfur Suspensions," Zeitschrift fur Physik, 1926, Vol. 40, No. 5, pp 368-377,

"The intensity of dispersed light as a function of particle size or time was detd. in S suspensions, pred. from  $H_2SO_4$  and aq. hyposulfite solns. The intensity of those components which oscillate in the plane of the incident and dispersed rays are in agreement with the theory of Rayleigh. The other components which oscillate perpendicular to the direction of the incident plane, increase with time faster than predicted theoretically. These facts can be explained qual. through the action of the smaller particles. The particle size ( $\eta$ ) is an empirical function of the time  $t$  and the concn. of the Hyposulfite soln. Was expressed by the equation:  $\eta = \eta_0 (1 - e^{-\alpha t})$ , where  $\eta_0$  and  $\alpha$  are consts."

POKROVSKIY, G. I.

"Particles Causing Scattering Of Light in the Crystalline Lens of the Eye," Kolloid-Zeitschrift, 1927, Vol. 41, pp 146-148.

"It is suggested that the scattering of light in the cryst. lens of the eye, to which the halo observed in a sudden glance at a bright light is attributed, is due to the presence of cylindrical particles in the eye.

POKROVSKIY, G. I.

"Results of Observations on the Scattering of Light in Suspensions,"  
Zeitschrift fur Physik, 1927, Vol. 41, No. 6-7, pp 493-506,

POKROVSKIY, G. I.

"Spectral Distribution of Polarization in Scattering of Light by  
Turbid Media," Zeitschrift fur Physik, 1927, Vol. 41, No. 8-9,  
pp 688-694.

POKROVSKIY, G. I.

"Equibrightness Curves on an Illuminated Sphere," Zeitschrift fur Physik, 1927<sup>h</sup>, Vol. 41, No. 8-9, pp 695-700.

POKROVSKIY, G. I., and VORDNKOV, G. P.

"The Optical Properties of Dispersed Mercuric Sulfide," Kolloid-Zeitschrift, 1927, Vol. 43, pp 78-81.

"Hydrosols of red HgS were prepd. in several degrees of dispersion by means of a colloid mill. These were illuminated by a bundle of parallel rays of light and an examn. was made of the light scattered at right angles to the illuminating ray and of the transmitted light. For coarse particles the scattered and transmitted light are nearly the same, but as the degree of dispersion increases they become continuously more nearly complementary. The transition sets in when the particles are still relatively coarse. It was observable with particles  $1\mu$  in radius."

POKROVSKIY, G.I.

"Scattering of Light in Water Clouds," Zeitschrift fur Physik, 1927,  
Vol. 43, No. 5-6, pp 394-403.

"Experimental work on the intensity and polarization with water-  
droplets from 0.4 to 0.7 in diameter. The results are in quali-  
tative and partly in quantitative harmony with the Rayleigh-Mie  
theory."



POKROVSKIY, G. I.

"Scattering of Light in Water Spray," Zeitschrift fur Physik, 1927,  
Vol. 43, No. 9-10, pp 769-772.

"Further measurements given. The results are in harmony with  
Wiener's calculations, as well as with the Rayleigh-Mie theory."

POKROVSKIY, G. I.

"Depolarization of Light by Dispersed Systems," Zeitschrift fur Physik, 1927, Vol. 45, No. 1-2, pp 135-139.

POKROVSKIY, G. I.

"The Question of the Intensity of Spectral Lines," Zeitschrift fur  
Physik, 1927, Vol. 45, No. 1-2, pp 140-145.

IL'YASHIN, G. I., and VASILEV, G. P.

"Optical Examination of Substances of Powder or Fiber Structure,"  
Kolloid-Zeitschrift, 1926, Vol. 45, pp. 1-7.

POKROVSKIY, G. I.

"Investigations on the Form and Structure of Soil Particles,"  
Kolloid-Zeitschrift, 1928, Vol. 45, pp 158-161.

"The important phases of the method used are described. The investigated soils were built up of particles of 2 sizes. The particles of these 2 sizes correspond to both maxima on the curve given. The interval between these maxima is on the other hand filled with conglomerates of small particles. These complicated forms are on account of their structure opalescent, which the positive value  $\beta$  signifies."

POHROVSKIY, G. I.

"Sensitiveness of the Eye," Physikalischr Zeitschrift, 1926, Vol.  
29, pp 269-271.

VORONKOV, G. I.

"Scattering of Light In Dispersed Systems of High Concentration,"  
Zeitschrift fur Physik, 1928, Vol. 46, No. 9-10, pp 753-758.

"It is shown that for dispersed systems of high concn. the intensity,  $I_d$ , of a beam after scattering by a thin layer is expressed by the equation  $I_d = I_0 [1 - e^{-a\sqrt{c}/\theta}]$ , where  $\sqrt{c}$  and  $\theta$  are quantities that can be calcd. from the  $n$  of the medium and from the relative  $n$  of the dispersed phase,  $a$  is a constant and  $I_0$  the incident intensity. Values calcd. in this way agree fairly well with Voronkov's data for silk fibers dispersed in various media."

POKROVSKIY, G. I.

"Reflection in Complex Systems," Zeitschrift fur Physik, 1926,  
Vol. 47, No. 11-12, pp 898-903.

"In many cases analyses of substances according to the degree of reflection can be of such practical importance, e. g., in the estn. of iron oxide or carbonaceous substances in the earth and in minerals and in detn. of the compn. of flour or of dyes. Analogous methods may serve in investigations of the surfaces of plants. The connection between compn. of substances and their color, etc., is shown by the method. Quant. analysis of substances by the intensity of reflected light was first carried out by P. Here, the reflection of disperse systems, composed of different kinds of elements, is considered. In the case of pulverulent substances a simple law has been found in good agreement with expt. The connection between compn. of a mixt. and its reflection is established, which is important for the quant. analysis of pulverulent substances. The paper is largely mathematical."



POKROVSKIY, G. I.

"Optical Characterization of Spark Emission Spectra," Zeitschrift für Physik, 1928, Vol. 48, No. 7-8, pp 586-593.

"By assuming that the energy consumed in a spark is proportional to the square of the root mean square value of the current flowing through the arc, the total intensity  $I$  of  $n$  spectral lines is shown to be related to the current  $i$  and to the absorptive power,  $k$ , of the metal vapor, through which the spark takes place by the expression  $I = ai^2 + b(1 - e^{-kei^2})$ , where  $a$ ,  $b$  and  $c$  are consts. It is also shown that for a given value of  $i$ ,  $I$  is linearly related to the width of the spark gap. Data relating to lines 5000, 5200, 5890 A. U. in the spark between Cu and electrodes are shown to be in agreement with the above expression."

POKROVSKIY, G. I.

"Upper Limit of Mass for a Star," Zeitschrift fur Physik, 1928,  
Vol. 49, No. 7-8, pp 587-589.

POKROVSKIY, G. I.

"An Upper Limit of Energy Density," Zeitschrift fur Physik, 1928,  
Vol. 51, No. 9-10, pp 730-736.

"The assumption is made that the greatest possible density of energy cannot be greater than the density of matter (considered as energy) in the heaviest atoms. As a consequence temp. and frequency also have upper limits. The max. temp. is  $3 \times 10^{12}$  degrees and the max. frequency is  $10^{23}$  ( =  $3 \times 10^{-5}$  A. U.)."

POKROVSKII, G. I.

"Scattering of Light in Water," Zeitschrift fur Physik, 1928,  
Vol 52, No. 5-6, pp 448-450.

"The Raman effect found is peculiar since no narrow lines but broad  
bands are found."

POKROVSKIY, G. I.

"Optical Method for the Investigation of Humus," Pochvovedenie, 1929, Vol. 24, No. 1-2, pp 124-130- In English, pp 131-136.

"P. presents a photometric method for the detn. of humus. The method is based on the well-known phenomenon of reflection and absorption of light by variously colored, variously dispersed substances or by a difference in compn. of the substances examd. A description of the app. as well as a math. discussion of the formula employed is given, and data presented check with the chem. methods."

POKROVSKIY, G. I.

"Distribution of Brightness in the Sky," *Physikalische Zeitschrift*,  
1929, Vol. 30, pp 697-700.

POKROVSKIY, G. I.

"An Optical  
/Method of Determination of Particle Size in Suspensions," Kolloid-  
Zeitschrift, 1929, Vol. 47, pp 55-58.

"Description of an 'opaloscope' or spectrophotometer for giving the  
av. size of colloidal particles from the Mie effect of the scattering  
of transmitted light. It is suggested for use in the examm. of flames  
and sprays."

POKROVSKIY, G. I.

"Interference Colors of Finely Dispersed Precipitates in Transmitted Light," Kolloid-Zeitschrift, 1929, Vol. 49, pp 1-3.

"Colors due to interference patterns are very vivid for condensed water vapor on cold glass but the duration of their existence is too small for study. Benzoic acid sublimed on glass also gives the phenomenon and the colors last for several days. The colors, however, are less intense. The wave length is a function of the incident light. A math. equation is given and it is shown that observed values agree qualitatively with calcd."



POKROVSKIY, G. I.

"Synthesis of the Elements," Zeitschrift fur Physik, 1929, Vol. 54, No. 1-2, pp 123-132.

"The question of the synthesis of a few elements from protons is discussed. The energies and frequencies of radiation emitted during such synthesis are considered. It is thought that the frequencies emitted are whole no. multiples of a fundamental frequency ( $\nu_0 = 1.33 \times 10^{13} \text{ cm.}^{-1}$ ) which depends upon the structure of time. The frequencies of the cosmic rays recently studied by Millikan and Cameron (C. A. 22, 3092) are compared with the theoretical frequencies and fair agreement is claimed. P.'s speculation lead to the notion that the abs. value of the gravitational potential cannot be greater than  $c^2$  anywhere ( $c$  = velocity of light). The energy of a proton cannot then be greater than  $c^2 H$  ( $H$  = mass of proton). On the other hand the max. energy residing in a proton must be  $(hc)/\lambda_0$  ( $\lambda_0$  = fundamental wave length); from which  $H = 1.667 \times 10^{-24} \text{ g.}$  as compared with  $1.662 \times 10^{-24} \text{ g.}$ )"

POKROVSKIY, G. I.

"Synthesis of the Elements," *Zeitschrift für Physik*, 1929, Vol. 54,  
pp 724-730.

"The energy of nuclear synthesis in interstellar space is assumed to come from the combination of a proton and an electron with emission of a quantum. The resulting velocity of the proton may carry it into the nucleus. The mass defects of the elements are calculated and the curve obtained agrees with Aston's (cf. C. A. 21, 3543)."

POIEROVSKIY, G. I.

"Possible Causes of the Change of Energy Into Matter," Zeitschrift  
fur Physik, 1929, Vol. 55 , No. 11-12, pp 771-777,

POKROVEKIY, G. I.

"The Synthesis of the Elements, (Part III)," Zeitschrift fur Physik, 1929, Vol. 57, No. 7-8, pp 560-565.

"The previously described mechanism for the building up of nuclei from protons is shown to hold also for  $\alpha$ -particles."

POKROVSKIY, G. I.

"Nature of the Resting Mass of Light Quanta," Zeitschrift fur Physik,  
1929, Vol. 57, No. 7-8, pp 566-569.

POKROVSKIY, G. I.

"Localization of the Mass of the Potential Energy of an Elementary Particle," Zeitschrift fur Physik, 1929, Vol. 50, No. 940, pp 700-705.

POKROVSKIY, G. I.

"The Probability Law for the Decomposition of Radioactive Materials in very small Concentrations," Zeitschrift fur Physik, 1929, Vol. 58, No. 9-10, pp 706-709.

"A simple expt. is described which shows that for small concns. of radioactive material and with a large aperture for observing the emitted  $\alpha$ -rays small deviations from the probability law exist. This probably means that the decompn. of a given atom is not independent of the neighboring atoms. The possibility of activation of radioactive preps. by radiation of very short wave length is discussed."

POKROVSKIY, G. I., and GORDON, E. A.

"Relationship Between Intensity, Polarization, and Angle of Scattering for Raman Radiation," (Moscow, Physics Institute of the Technical High School, Annalen der Physik, 1930, Vol. 4, No. 5, pp 488-492.

"Investigations were carried out with water and  $C_6H_6$  by 2 methods. In the first the scattered light was photographed by means of a large quartz spectograph and the spectrum measured by a microphotometer. In the second the scattered light was measured directly by a modified Weber's photometer. Both methods gave the same results. In certain cases the light is not symmetrically scattered, but a phenomenon can be observed which is similar to the Mie effect."



POKROVSKIY, G. I., and VORONOV, G. P.

"Experimental Investigation of the Absorption Ability of Some Materials for light of Different Wave Lengths as a Function of Particle Size," Kolloid-Zeitschrift, 1930, Vol. 50, pp. 17-19.

"The ratio of the transmitted light to the incident light was detd. for HgS and ultramarine suspensions at various wave lengths and for particle sizes, detd. by Stokes' law, from 675-475 $\mu$ . The exptl. values of the absorption coeff. approach those required by the Rayleigh theory as the particle size decreases. The difficulties of accurate duplication are the irregular sizes of the particles and the magnification of errors by the graphical differentiation used. The color of the suspension changes when the effective radius is less than the wave length of the incident light."

POKROVSKIY, G. I.

"Expulsion of  $\alpha$ -Particles from the Nuclei of Radioactive Substances by Short-Wave-Length Radiation," Zeitschrift fur Physik, 1930, Vol. 59, No. 5-6, pp 427-432.

"In a layer of ZnS contg. a small quantity of Ra together with its decompn. products the rate of scintillation was increased by the action of  $\gamma$ -rays from Ra. After exposure the rate of scintillation was lower than normal, and recovered gradually. X-rays gave similar results. Conclusion: The  $\gamma$ -rays exert an influence on the disintegration, and a 'ripening' process precedes the disintegration of each atom."

POKROVSKIY, G. I.

"Expulsion of  $\alpha$ -Particles from Atomic Nuclei of Radioactive Substances,"  
Zeitschrift für Physik, 1930, Vol. 60, No. 11-12, pp 845-849.

POKROVSKIY, G. I.

"Connection Between Angle of Diffusion and Intensity in Molecular Light Scattering," Zeitschrift fur Physik, 1930, Vol. 60, No. 11-12, pp 850-855.

"In connection with previous work )Z. Physik 53, 67) Rayleigh's formula is used to calc. the diffusion of light in the atm. and found in agreement with the values observed by C. Dorno (Physik der Sonnen und Himmelsstrahlung)."

POKROVSKIY, G. I.

"A Possible Influence of Short-Wave Radiation on Atomic Nuclei,"  
Zeitschrift fur Physik, 1930, Vol. 63, No. 7-8, pp 561-573.

"Under the influence of soft x-rays and y-rays the following elements exhibit radioactive properties as shown by scintillations and ionization measurements: Cu, Mo., Ag, Cd, Sn, Sb, W, I, Pt, Au, Pb, Bi, Hg.  
A theoretical interpretation is given."

POKROVSKIY, G. I.

"Experimental Result on the Scattering of Light in the Range of Small Angles," Zeitschrift fur Physik, 1930, Vol. 65, No. 1-2, pp 130-132.

"A beam of light passes through a layer of water]or an alcohol water mixture and the light scattered is received on a photographic plate, the primary beam being removed by interposition of a little screen. The intensity of the light scattered, as function of the distance R from the primary beam is obtained photometrically and it is shown to vary proportionally with  $1/R$  as required by the author's theory."

POKROVSKIY, G. I.

"Supplementary Note to My Paper: The Probability Law for the Decomposition of Radioactive Materials in Very Small Concentration," Zeitschrift fur Physik, 1930, Vol. 65, No. 1-2, pp 133-138.

"According to the law of radioactive decay the no. of radioactive atoms ought to be a function of time  $t$ :  $\lg N - \lg N_0 = -\lambda t$ ,  $N_0$  being const. This process was studied by counting the no. of scintillations on a ZnS screen contg. a radioactive substance in very low concn. ( $C \sim 10^{-12}$  g. Ra equiv./sq. m.). It is found that  $N_0$  is not a const. and that the deviation from the const. becomes larger the smaller the concn. of the radioactive prepn."

POKROVSKIY, G. I.

"The Dirac Theory of Protons and Electrons," Zeitschrift fur Physik, 1930, Vol. 66, No. 1-2 pp 129-136.

"In Dirac's theory, all values of electronic energy greater than  $m_e c^2$  and less than  $-m_e c^2$  are possible; the lower states are for the most part occupied by electrons, the few unoccupied states constituting the protons. The difficulty arises that the transition of an electron from the region of  $\pm$  energies to an unoccupied states of lower energy, with the consequent neutralization of a proton and emission of the corresponding radiation should, in contradiction to experience, be a relatively frequent process. It is shown, however, that this transition must end in a state in the prohibited region, and the difficulty disappears. Further, there is an upper limit to the frequency of any radiation susceptible to a microscopic observation, such that  $\nu_0 = (m_0 M_0) c^2 / h$ ,  $m_0$  and  $M_0$  being the rest masses of electron and proton, resp.; and all motions of elementary particles take place in quantum jumps, with the min. time of  $\hbar_0 / c$  between consecutive jumps, where  $\hbar_0$  is the length of the elementary cell. A relation between the difference in mass of a free proton and of one contained in an at. nucleus and the frequency of occurrence of different species of atoms is partly verified by expt."



POKROVSKIY, G.I.

"Theory of the Possible Action of Radiation of Atom Nuclei,"  
Annalen der Physik, 1931, Vol. 9, No. 4, pp 505-512, (Röntgentechnische  
Abteilung des Elektrotechnischen Staatsinstituts).

POKROVSKIY, G. I., and KORJUNSKIY, V. K.

"Laws of Atom Occurrence in the Earth's Crust and in Meteorites,"  
Naturwissenschaften, 1931, Vol. 19, pp 421-422.

"From the data of I. And W. Noddack on the occurrence of elements in the earth and in meteorites a curve is constructed of  $\log N_1/N_2$  versus Z, at. no.,  $N_1$  and  $N_2$  being the frequency of occurrence on earth<sup>2</sup> and on meteors, resp. The curve is periodical and ver much like the at. vol.-curve, indicating that on the earth's surface mainly light elements are found."

PODROVSKIY, G. I.

"A Periodic Regularity of Atomic Nuclei," Naturwissenschaften, 1931,  
Vol. 19, pp 573,."

"The no. of nuclear electrons depends on the at. no.  $N$  but for certain values of  $N$  a no. of electron combinations are possible. By plotting the no. of isotopes for at. n.  $N+5$  against  $N$  a periodic curve is obtained largely similar to the at. vol. curve but shifted to the left."

POKROVSKIY, G. I.

"Attempt to Use Several Thermodynamic Statements for the Description of Phenomena in the Atomic Nucleus," Physikalische Zeitschrift, 1931, Vol. 32, pp 374-377,

"Application of the Boltzmann principle to nuclear disintegration."

POKROVSKIY, G. I.

"The Investigation of Specific Surface of Powdered Substances by Optical Methods," Kolloid-Zeitschrift, 1931, Vol. 55, pp 321-323.

"The Equation previously deduced is applied experimentally."

POKROVSKIY, G. I.

"A New Effect Produced by Action of X-Rays on Matter (All-Union Electrotechnical Institute, Moscow), *1958, pp 226-250, 1958*

"This paper describes an investigation of the weak radioactivity which some heavier elements acquire after being irradiated by x-rays. The 1st method of investigation of this effect is based on the measurement of the ionization produced by the sample after irradiation. The 2nd method consists in the counting of the scintillations produced by particles emitted by the irradiated substance. The combination of these 2 methods makes it possible to det. the mean energy of each emitted particle, which is of the order of  $10^{-6}$  erg. It seems quite impossible that particles of such energy arise in the extranuclear electrons. It is more probable that they originate in the at. nuclei. Radioactive contamination is eliminated. Possible explanations of the phenomena observed are discussed."

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200

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PROCESSES AND PROPERTIES INDEX

*BI 3*

Cohesion forces in soils. G. I. Parzenov and V. G. Dvornikov. (Moscow, 1958; 60, 210-216).—The cohesion of the particles of a powder wetted by a liquid is investigated theoretically. A simple apparatus for determining cohesion in soils is described; the experimental results agree with theory. E. S. H.

ASS-SLA METALLURGICAL LITERATURE CLASSIFICATION

8-2



POKROVSKIY, G. I.

"Periodic Properties of Atomic Nuclei, Journal of Physics and Radium, 1932, Vol. 3, No. 7, pp 150-154, (Department of X-ray Technique of the Electrotechnical Institute of the USSR).

"Nuclei for which  $H$ , the no. of protons, is a perfect cube have stable configurations. Accordingly each period has the following possible no. of values of  $H$ : 7, 19, 37, 61 and 91. From this periodicity the existence of radioactive elements is predicted near the at. wts. 137, 86 and 39. 39 and 86 correspond to K and Rb, resp., which have radioactive isotopes. The generalizations of Harkins are considered as support of this periodicity."

POKROVSKIY, G. I.

"Some Periodic Properties of Atomic Nuclei," Journal of the American Chemical Society, 1932, Vol. 54, pp 623-625, (All-Union Electrotechnical Institute, Moscow, USSR).

"By using Latimer's model of the nucleus large tetrahedra can be built consisting of 4, 10, 20, 35 and 54 elements, contg. 16, 40, 80, 140 and 216 protons, resp. By assuming that nuclei of analogous form have analogous properties, periodic variations with the period expected have been found for the no. of electrons in addn. to  $\alpha$ -particles, the no. of isotopes, and the differences for 2 neighboring elements of the logarithms of the relative nos. of elements with even and with odd nos. of electrons, each plotted against the at. wt."

POKROVSKIY, G. I.

"Reply to E. N. Fox's Comment on Cohesion Forces in Soils," Kolloid-Zeitschrift, 1932, Vol. 61, pp 383-384.

POKROVSKIY, G. I.

"Periodical Properties of Atomic Nuclei," Science, 1932, Vol. 75,  
pp 443-444, (All-Union Electrotechnical Institute).

"A connection between the nucleus and its electron covering is found in the periodicity of the no. of isotopes having the same st. wt., considered as a function of the st. wt. This nuclear property shows the same period as the at. vol., which is a property of the outer electrons. Only those nuclei can have the same form as a proton which have the following at. wts.:  $13, 2^3, 3^3, \dots, 6^3$ ."

15

COHESION FORCES IN SOILS WITH UNCHANGED STRUCTURE.  
V. G. Bulukhev and G. I. Likhovskii. *J. Tech. Phys.*  
(U. S. S. R.) 3, 625-31 (1933).—Cohesion forces in soils  
depend on the way in which the water content and the  
relative shapes of the soil particles affect the capillary  
forces. F. H. Rathmann

POKROVSKIY, G. I.

"Application of Boltzmann's Principle to Certain Kinds of Movement,"  
Zeitschrift fur Instrumentenk, 1933, Vol. 14, No. 2, pp 67-69.

POKROVSKIY, G. I.

"The Theory of Friction in Coarsely Dispersed Substances," Kolloid-Zeitschrift, 1933, Vol. 63, pp 25-27.

"The increase in frictional forces on decreasing the particle size of quartz sand from 0.8 to 0.13 mm. are satisfactorily calcd. by an equation derived by the application of the probability law."

POKROVSKIY, G. I., and BULYCHEV, B. G.

"Mechanical Properties of Disperse Systems. I. The Deformation of Soils by Pressure," Kolloid-Zeitschrift, 1933, Vol 64, pp 175-178.

"The rigidity of a system of disperse particles depends on the no. and kind of contacts between the particles. A force producing a deformation changes the no. of contacts. By applying statistical methods, a curve is derived that agrees with exptl. data. Where inner forces such as capillary forces exist in the system, a neg. deformation may occur at the completion of the action of a force; this action appears to be an ultra-elasticity."

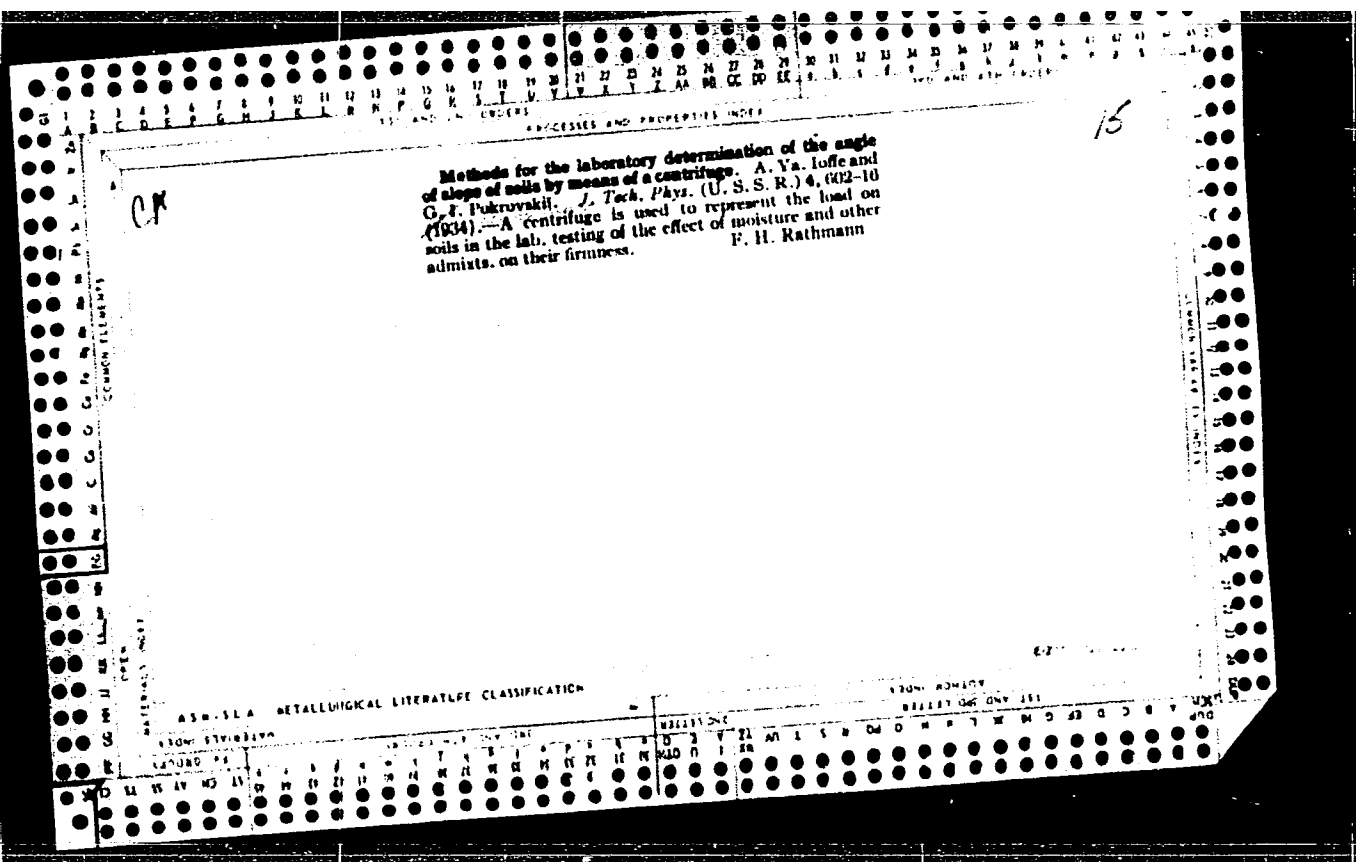


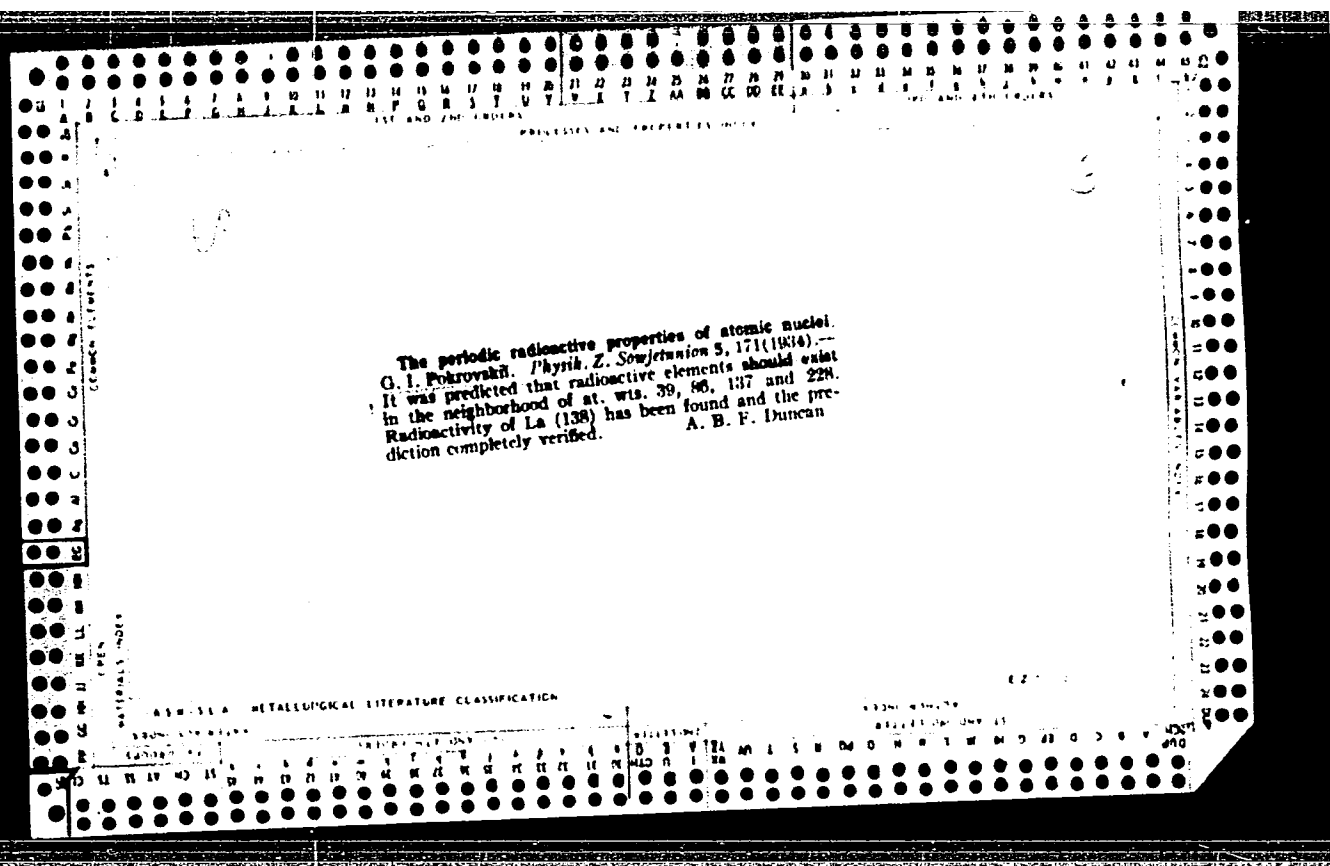
POKROVSKIY, G.I., RUTSOV, A., and ROMANOVA, N.

"Silvering of Mirror Surfaces by Cathodic Sputtering," Comptes Rendus of AS USSR, 1934, Vol. 1., pp 15-18.

"Surfaces prepared by cathodic sputtering in H<sub>2</sub> at 0.04-0.05 mm. pressure using an applied voltage of 1200-1400 volts d. c., and a current of 15-20 milliamp., are very suitable for use in interference gratings."

1ST AND 2ND ORDERS										PROCESSES AND PROPERTIES INDEX									
<p>CA</p>										<p><b>Mechanical properties of disperse systems. Dependence of deformation upon the time.</b> G. Pokrovskii, <i>Tekhn. Phys. (U. S. S. R.)</i> 1, 124-7 (1934) (in German). Equations are developed for semiplastic bodies and are verified on wood.</p>									
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<p>ASD-SLA METALLOGICAL LITERATURE</p>										<p>CLASSIFICATION</p>									





POKROVSKIY, G. I., ROMANUVA, M., and RUBTSOV, A.

"Silvering of Mirror Surfaces by Cathodic Sputtering," Physikalische Zeitschrift der Sowjetunion, 1934, Vol. 5, No. 5, pp 746-760.

POKROVSKIY, G.I., and BULICHEN, V. G.

"Mechanical Properties of Disperse Systems. II. The Deformation of Gels by Pull," Kolloid-Zeitschrift, 1934, Vol. 66, pp 137-139.

"The equation, previously deduced, applies to both pressure and pull strains. There is no stepwise change in the elasticity modulus on passing from a pressure to a pull force."

POPOVICH, G. I., and PANDOV, I. B.

"By statistical methods, equations representing the change of deformation with time as a function of vibrations or of load at const.vibrations, are derived, omitting resonance effects. The equations reproduce accurately the exptl. data for soils."

"Mechanical Properties of Disperse Systems. III. The Action of Vibrations on the Defromation of Disperse Powder Substances," Kolloid-Zeitschrift, 1934, Vol. 66, pp 270-272.

SINELSHCHIKOV, S. I., and POIKROVENIY, G. I.

"Microphotographic Investigations of Contact Points in Soils,"  
Kolloid-Zeitschrift, 1934, Vol. 67, pp 35-37.

"Swelling soils contain spherical aggregates, easily deformed,  
with survade contact while non-swelling soils contain particles forming  
contacts by single contact points."



11 AND 12D. SCRIPT										13D AND 14D. CODES									
PROCESSES AND PROPERTIES INDEX																			
<p>15</p> <p>CK</p> <p>A new apparatus for determining the angle of internal friction and cohesion in soils. N. P. Anan'kov and G. I. Pokrovskii. <i>J. Tech. Phys.</i> (U. S. S. R.) 5, 725-9 (1935). Description and theory of app. F. H. R.</p>																			
ASB-11A METALLURGICAL LITE										12 CLASSIFICATION									
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Determination of the angle of internal friction of a bound soil by means of a centrifuge. N. P. Anakhov and G. I. Pokrovskii. *J. Tech. Phys.* (U. S. S. R.) 5, 790-804 (1935).—Data are given for various Soviet soils and clays. The modelling of filtration. A. Ya. Ioffe. *Ibid.* 804-11.—Filtration through soils is studied by means of a centrifuge. Math. F. H. Rathmann

ASS-51A METALLURGICAL LITERATURE CLASSIFICATION

POKROVSKIY, G.I.

"Mechanics of Frozen Ground," Zhurnal Tekhnicheskoi Fiziki, 1935, Vol. 5, No. 6, pp 1047-1056, (Moscow, Gruppya Fiziki Guntov VIOS). Translation available at the Library of Congress Translation Center.

"The basic properties of frozen ground are quantitatively described and treated from a mathematical standpoint. Formulas are introduced for the determination of adhesive forces between solid particles unified by ice, the moisture content and the hydro-dynamic forces of the active layer (permafrost areas), and the rate of settling of structures erected upon frozen ground. Continuation and expansion of these studies are suggested."

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2

THE QUANTITY OF HYGROSCOPIC MOISTURE RETAINED BY A  
 dispersed system. G. I. Pokrovskii, *Pedology* (U. S. S. R.) 31, 1022-8 (1936). From thermodynamic considera-  
 tions one is made of the following formula:  $\ln b = -e[(1/r_1) + (1/r_2)] \frac{\sigma}{R_0 T}$ , where  $b$  = the ratio of the vapor pressure  
 to the pressure in a satd. state (at a given temp.). This  
 value may be equal to the relative humidity of the air;  
 $\sigma$  = the surface tension of the liquid;  $r_1$  and  $r_2$  are the  
 radii of the curvature of the meniscus;  $\mu$  = the mol. wt.  
 (for water  $\mu = 18$ );  $R_0$  = the universal gas const.;  $\gamma$  =  
 wt. of water;  $T$  = the abs. temp. From this formula a  
 series of equations is developed that offers an approx.  
 method of detg. the quantity of water retained by a dis-  
 persed system under various conditions. The equations  
 derived, when applied, show that hygroscopic water in  
 equil. with unatd. vapors is, in the case of solid disperse  
 systems (soils), partly held by capillary forces and partly  
 as a surface membrane. The total hygroscopic water  
 absorbed by a soil can be calcd. theoretically. The equa-  
 tions derived are applied to the expl. work of Puri, Crow-  
 ther and Keen (C. A. 20, 400), and the thickness of  
 the adsorbed membrane of water and its relation to  
 the humidity of the air are detd. J. S. J.

AS-SLA METALLURGICAL LITERATURE CLASSIFICATION

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PROCESSING AND PROPERTY NOTES

Emission of zinc from brass due to electron impact.  
G. I. Pokrovskii and S. T. Smitsyn. *J. Exptl. Theoret. Phys.* (U. S. S. R.) 8, 1174 7 (1938). A thin brass plate was subjected to electron bombardment in a vacuum tube, and the rate of diffusion of Zn in brass calcd. by the Grinberg diffusion equation,  $dQ/dt = 2\pi DNe$ , where  $dQ/dt$  = rate of emission of Zn,  $N$  = fraction of Zn in brass,  $R$  = radius,  $t$  = time. The high value of  $D$  so obtained, 0.4 sq. cm./day, is ascribed to thermal and elec. effects. In the initial stages, when Zn is emitted from near the surface, the temp. of the plate remains const.; when the electrons must penetrate further into the plate to effect Zn atom emission, the temp. of the plate rises by several hundred degrees, but not sufficiently to account for the effect.  
P. H. Rathmann

ASST. DIR. METEOROLOGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
PROCESS AND PROPERTIES INDEX																			
<p><i>Ca</i></p> <p>The water bound in peat. G. I. Pokroykil. <i>Torfyannyye Ind.</i> 1939, 28-30; <i>Chem. Zvest.</i> 1939, II, 1210.— The possibility of detg. the bound water in peat by detg. the break in the vol. or temp. curves during freezing is discussed. The amt. of combined water depends upon the moistness of the peat; it increases at first with increase in the dampness of the peat and later decreases. The fixed or combined water in the peat first freezes definitely below 0°, the temp. varying with the degree to which it is combined. The drop in the freezing temp. below 0° can therefore be taken as a measure of the energy of fixation (or combination) of the water by the peat. M. G. M.</p>																			
<p>ASB-S, A METALLURGICAL LITERATURE CLASSIFICATION</p>																			
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<p>1ST AND 2ND ORDERS</p>										<p>3RD AND 4TH ORDERS</p>									

2

Physical processes in the course of deformation of sand.  
G. I. Pokrovskii. *J. Tech. Phys.* (U. S. S. R.) 9, 644-53  
(1939).—A cylinder was filled with sand, the air between  
the sand particles displaced by water, and the sand-water  
mixture, compressed by a piston permeable to water and im-  
permeable to sand. The lowering of the total vol.  $\Delta V$  was  
compared with the vol.  $\Delta v$  of the water that was squeezed  
out; the relative compression  $(\Delta V - \Delta v)/\Delta V$  of sand  
was 0.06. In accordance it was 0.04. It is concluded that  
the modulus of elasticity of sand is much less than that of  
quartz in bulk. When the sand runs through a metal  
funnel (tin, brass or iron) it acquires an elec. charge the  
magnitude of which decreases with increasing no. of runs.  
This triboelectric effect also shows that the surface of sand  
differs from its interior. J. J. Bikerman

Heat diffusion in clay and peat. N. A. Nasedkin and G. I. Polubovskii. *J. Tech. Phys.* (U. S. S. R.) 9, 1515-26 (1938).—The distribution of water and temp. in a column of peat heated at one end was detd. In calc. it was supposed that the air in peat is present as sep. bubbles the vol. of which depends on the temp. and the surface tension of the surrounding water. The theory is not supported by exps. J. J. Siskerman.



POINCARÉ, G. I.

"Theory of Elasticity as a Special Part of Thermodynamics,"  
Zhurnal Tekhnicheskoi Fiziki, 1939, Vol. 9, No. 22, pp 1979-  
1983.

"The distribution of deformations in an elastic body can be calculated by considering the probability of some given d. of energy in a given element of vol. Thus the theory of elasticity is connected with Boltzmann's theory."

POKROVSKIY, G. I., and LITEL'SHIKOV, S. I.

"Bound Water in Peat," Pochvovedenie, 1939, No. 12, pp 64-75.

"It is proposed to define the bound water in peats and soils as the difference between the total water and the ice formed when the material is frozen under definite conditions. The quantity of bound water thus becomes a function of the water content and temp. of the peat."

1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
PROCESSING AND PROPERTIES INDEX																			
BC										B-3-1									
<p>Plasticity and strength of steel. G. I. Petrovskii (Petrovskii, 1940, No. 3, p. 100). The internal forces opposing the tearing apart of the particles are (1) those of the particles themselves, (2) those of the particles of the matrix. The particles can thus readily slide over each other without losing coherence. This is the characteristic of plasticity. S. and F. (m)</p>																			
<p>ASB-51A METALLURGICAL LITERATURE CLASSIFICATION</p>																			
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<p>535.64 - 3 1301</p> <p>Principles of colour measurement applied to the preparation of mixed colours. FOMKOWSKI, G. I. C.R. Acad. Sci., URSS, 92 (No. 9) 637-9 (1941) In German: Gives the equations representing the colours of mixed pigments when these are (a) opaque, (b) transparent and shows that a colour metric for pigment mixtures can be constructed, using this method of treatment as its basis. J. W. T. W.</p>																																																			
ASB-ILA METALLURGICAL LITERATURE CLASSIFICATION																										6-2-1941-1941-1941																									
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